

KINETICS STUDIES OF THE $\text{HO}_2 + \text{ClO}$ REACTION

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The $\text{HO}_2 + \text{ClO}$ reaction is the key rate-limiting step in the chlorine-catalyzed destruction of ozone in the lower and middle stratosphere. Product channels leading to HOCl and HCl are both exothermic and a small HCl channel will significantly alter the partitioning of inorganic chlorine in the lower stratosphere.

The only previous temperature dependence study' **on this** reaction displays strongly curved Arrhenius-plot with negative "activation energy". In a recent matrix-isolation/FTIR investigation evidence was found for ozone (and ultimately for HCl) formation at low temperatures.

In this study the rate coefficient and products of the $\text{HO}_2 + \text{ClO}$ reaction have been investigated over a wide temperature range in a low pressure flow reactor using electron-impact mass spectrometric detection of both reacting radicals.

Different radical sources were used to generate the reactants. $\text{Cl} + \text{CH}_3\text{OH} + \text{O}_2$ or $\text{Cl} + \text{HCHO} + \text{O}_2$ served as HO_2 source while the reaction of Cl atoms with OCIO or ozone was used to make ClO radicals.

In agreement with the previous study¹, the rate coefficient showed negative temperature dependence. However, we did not find remarkable curvature in the Arrhenius plot, and the rate coefficient determined in this work is 30-50% lower at every temperatures studied.

Qualitative evidence was found that ozone being formed at low temperatures. Further work to quantify this reaction channel is under progress.

The implications of the measurements of the rate coefficient and branching ratio results for atmospheric chemistry will be discussed.

References:

- 1.) R. M. Stimpfle, R. A. Perry, C. J. Howard, *J. Chem. Phys.* **71**, 5183, (1979)
- 2.) M. Finkbeiner, J. N. Crowley, *et al.*, *J. Phys. Chem.* 99, 16264, (1995)

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